Cleaning Contaminated Concrete

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Feucht Resources, LLC
Moorestown, New Jersey, USA:
This question generates a series of questions that must be answered before recommending both the coating system and the surface preparation. The questions are as follows.
- What is the degree of contamination? The term “well contaminated” in the question implies that there is a significant degree of contamination.
- How old is the concrete?
- Is the concrete slab on grade? If so, is there a vapour barrier under the slab? If no vapour barrier was used, what is the moisture transmission rate through the concrete floor?
- Is there an existing coating or sealer on the floor?
- How level does the floor need to be for its new use?
- What level of aesthetics is desired?
- What type of traffic will be present (e.g., foot, hand carts, lift trucks)?
- What will be the cleaning procedures for the floor once it is installed?
- Are there joints in the floor? If so, what are the dimensions?
- Are there cracks in the floor? If so, how many, how wide, and where?

The answers to the above questions will lead to the proper recommendation for surface preparation and coating. Usually, a parking garage has specific areas of contamination that need to be cleaned before general surface preparation can be performed. The Surface Preparation Standard SSPC-SP 13/NACE No. 6, “Surface Preparation of Concrete,” is an excellent guide to use for both removing contamination and preparing the concrete surface. This guide also provides reference information on detecting and testing for contamination.

The degree of cleanliness, surface preparation, and surface strength will depend on the selected coating and its intended use. For instance, many epoxy primers tolerate some degree of oil contamination. However, good general practice is to remove the grease and oil contamination from at least the surface of the concrete. Decontaminated areas should then be tested to make sure they are not hydrophobic. That is, if they can be wetted with water without beading, they have been decontaminated adequately.

After the grease and oil are removed, surface preparation of the entire surface should be conducted. Rubber contamination and surface laitance should be removed by mechanical means, such as centrifugal shot blasting. The degree of profile and removal of laitance depend on the type of coating and the intended use of the floor.

The type of coating depends on the answers to the above questions. A thin-film coating of 2 to 6 mils (50 to 150 micrometres) will provide an improved appearance but will have limited durability and will not hide surface imperfections. A high-build, broadcast or trowel-applied system of 125 to 250 mils (3 to 6 mm) will hide surface imperfections and will provide a high level of durability. In addition, many coating systems that fall between the 6-mil and 125-mil (50-micrometre and 3-millimetre) thickness ranges can be used, including high-build elastomers. The durability and aesthetics of each system will vary.

The best approach is to have someone knowledgeable in floor coatings inspect the area and suggest a few options.

Peter Curtis
Dumar Resins
Lincolnshire, UK:
The essence of longevity of any coating system is, in the main, linked to careful and correct preparation of the substrate, followed by the use of an appropriately specified product. Selecting the correct surface preparation techniques, utilising the right equipment, and following the manufacturer’s instructions carefully greatly increase the likelihood of a successful application.

All too often, industrial floor contractors encounter heavy and ingrained contamination of a cementitious substrate by oil- and grease-based components. Only specialised surface preparation can remove a build-up of grime from years of use. Initially, shot blasting will remove the surface contaminants, only to expand.
pose the areas of more deeply ingrained oil and grease. Hot forced air equipment may then be used to deal with this problem.

Recycled shot blasting uses a wide variety of abrasives “fired” into the surface of the floor in a stream of compressed air. The air, grit, and surface particles are recycled, filtered, and reused where necessary. In the UK, chilled iron grit and rounded shot particles are the abrasives most commonly used for this purpose. Different grades and sizes are used to vary the end profile of the floor. This work should be carried out by a specialty surface preparation company. A trained operator can be expected to achieve up to 900 sq m (9,800 sq ft) of floor preparation in a typical working day using this method.

Hot forced air treatment directs an extremely hot gas jet flame onto the newly exposed cementitious surface. This treatment vapourises any oil-based contaminants in the upper surface of the floor. Again, this is a specialised job, and only skilled and trained operators should undertake it. Immediately after the heat treatment, a suitable floor sealant coating should be applied. A high-solids, two-pack primer is recommended for this, using the residual heat in the floor to bring about a faster cure. For more effective sealing, a second coat of the primer may be applied after the
first coat has cured. It may be necessary to consult the resin manufacturer for advice on this point. Painting can follow after the primer has hard-cured.

Once the floor surface has been effectively sealed, the type of coating to use depends on what the floor area is to be used for. Storage areas may be sufficiently protected by the application of two coats of a water-thinnable two-pack epoxy. If there is considerable vehicular traffic over the finished surface, a high-build, solvent-free seal coat may be in order. For chemical storage areas, a two-pack aliphatic urethane system may provide the answer.

Again, seek out the technical advice of a reputable floor resin manufacturer. Broad spectrum biocide additives are available in most coatings to provide additional protection against mildew and fungal infestation in the finished floor system.

Mark Milewski
The Valspar Corporation
Chicago, Illinois, USA:
Ultimately, what will determine the adhesion of any coating is the preparation of the substrate. Oil and grease are some of the best bond breakers. I would recommend using a highly alkaline detergent (with a pH of 12+). The detergent should be scrubbed in and vacuumed out. This type of extraction cleaning should be repeated until the grease and oil stop leaching from the concrete during the degreasing operation.

Once the substrate is free of the oily appearance, preparation by mechanical means is recommended. Shot blasting is the preferred method for concrete preparation and will ensure that any unsound, softened matter is removed.

After preparation, the surface should be inspected for further signs of leaching. Additional washing may be required, followed by thorough drying. Apply an oil-tolerant primer followed by the coating system specified.

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Got an Answer? Here Are Some Upcoming Questions

Readers are welcome to submit answers for upcoming Problem Solving Forum questions shown below. In addition to submitting answers, readers may also submit questions for the Forum.

Continued
• If my company employs an inspection agency to verify compliance with specifications for a painting project and the coating subsequently fails prematurely, should the inspection agency bear some responsibility for the failure?
• What is the influence of admixtures (hardeners, dust suppressants, etc.) to concrete on the subsequent adhesion of protective coating systems? If there are negative effects, what can be done to eliminate them?
• As a cost-cutting measure, some facility owners have recently begun to provide bidding contractors with the amount of steel to be cleaned and painted rather than provide facility design and detail drawings. Is this a reasonable practice (to solicit realistic bids)? Why or why not?
• How do you detect microbiologically-influenced corrosion?
• Are any of the laboratory electrochemical techniques used in coating research viable for the prediction of coating performance in practice?

Responses should be 1–2 typed, double-spaced pages. Responses and questions should be sent along with your name, address, and telephone and fax numbers to: Brian Goldie, Publisher, PCE
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